

FLYABLE BALL

Background of the Present Invention

1. Field of the Invention

The present invention relates to an object such as a toy or ball which, when
5 rotated or spun through the air, utilizes centrifugal force and gyroscopic and
aerodynamic principles to fly through the air. The object is held and thrown into the
air in much the same manner as a Frisbee disk.

2. Brief Description of the Prior Art

The flight of the Frisbee disk has been known for many years. It consists of a
10 unitary, generally circular plastic body in the shape of a plate or pie tin or of similar
configuration which forms a wing and when spun in the air, stays aloft due to
aerodynamic lift and gyroscopic stability. Forward flight splits rushing air at the
leading edge of the airborne disk. Half of the air goes over the top of the disk and
the other half of the air goes underneath the disk. Because the edge of the disk is
15 tipped up, the disk deflects the lower airstream downward. As the disk pushes down
on the air, the air pushes upward on the disk resulting in a force known as the
aerodynamic lift. The upper airstream is also deflected downward like all viscous
fluids, since flowing air tends to follow curved surfaces even when those surfaces
bend away from the airstream. The inward bend of the upper airstream is
20 accompanied by a substantial drop in air pressure just above the disk thereby
sucking the disk upward.

The prior art further includes the following U.S. patents: U.S. Patent No.
3,758,985 issued on September 18, 1973 to Heisler entitled "Discus Toy"; U.S.
25 Patent No. 4,262,911 issued on April 21, 1981 to Opresik et al entitled "Martian Flyer
or Earth U.F.O."; U.S. Patent No. 4,335,536 issued June 22, 1982 to Magid et al
entitled "Inflatable Throwing Toy"; U.S. Patent No. 5,045,011 issued September 3,
1991 to Lovik entitled "Flying Balloon Toy"; U.S. Patent No. 5,123,869 issued June
23, 1992 to Schipmann entitled "Aerodynamic Toy"; U.S. Patent No. 5,360,363
30 issued November 1, 1994 to Levin entitled "Flying Disk with Rotatable Member"; U.S.
Patent No. 5,882,239 issued March 16, 1999 issued to Trichak entitled "Illuminatable
Aerodynamic Disc or Saucer"; and U.S. Patent No. 5,984,753 issued November 16,
1999 to Perez entitled "Aerodynamic Toy".

Summary of the Present Invention

A feature of the present invention relates to a flyable ball comprising a unitary spherically shaped body made from a resilient material, with the body having a center axis, a transverse center axis and a radially outwardly extending annular ring or rim projecting from the body and located below the transverse center axis for supplying centrifugal stabilization when the ball is thrown through the air with a spin.

Another feature of the present invention is to provide a flyable ball of the aforementioned type wherein the annular rim includes a pair of surfaces which are configured and shaped to form an air foil which causes lift and guides the ball in flight after the ball is spun through the air and thrown by a person gripping the annular rim.

Still another feature of the present invention is to provide a flyable ball of the aforementioned type wherein the body has a hollow interior and is inflatable with air directed through a valve provided in the body.

A further feature of the present invention is to provide a flyable ball of the aforementioned type wherein the resilient material is vinyl plastic.

A still further feature of the present invention is to provide a flyable ball of the aforementioned type wherein the resilient material of the spherically shaped body is a chemically activated foam which fills the interior thereof.

Another feature of the present invention is to provide a flyable ball of the aforementioned type wherein the ring or rim has an annular groove in one of the surfaces which is furthest away from the transverse axis, with the air moving under the ball creating a vacuum where the air contacts the grooved rim.

Still another feature of the present invention is to provide a flyable ball of the aforementioned type wherein the surface of the annular rim closest to the transverse axis curves in a direction towards the surface provided with the annular groove.

Another feature of the present invention is to provide a toy or ball which is made by a molding process and which is simple in construction, easy to manufacture, economical to produce and efficient in operation.

Brief Description of the Drawings

Figure 1 is a top perspective view of the flyable toy or ball.

Figure 2 is a sectional view through the center of the ball taken on the line 2-2 of Figure 1 and showing the solid foam interior thereof.

5 Figure 3 is a top view of the flyable ball in flight illustrating the air circulating across the top of the ball and around the rim.

Figure 4 is a front elevational view of the ball or toy, with a rim part broken away and in section, and illustrating the toy in rotation, with air flowing across the top and bottom of the toy resulting in an upward aerodynamic lift.

10 Figure 5 is a top perspective view of another embodiment of the flyable toy or ball.

Figure 6 is a cross sectional view through the ball taken on the line 6-6 of Figure 5 and illustrating the hollow interior thereof filled with air.

Description of the Preferred Embodiment

The present invention discloses two embodiment of the toy, one embodiment having a solid foam interior and the other ball being inflatable, with the interior thereof occupied by air. Each embodiment is made by a molding process, with
5 similar but different molds being used in producing each embodiment. The inflatable ball (Figs. 5 and 6) is made from vinyl utilizing a conventional rotational molding process. The foam toy is made in a mold in which the chemically activated foam is injected with the foam growing after it is poured into the mold.

Referring now to Figures 1 and 2, the toy or ball is designated by the numeral
10 10. It has a unitary spherically shaped body 12 made from a resilient plastic material such as a chemically activated foam now utilized in producing Nerf footballs for children.

The spherically shaped body 12 has a center axis 14 and a transverse axis 16 which intersects and is perpendicular to the center axis 14. The body 12 is provided
15 with a radially outwardly extending annular ring or rim 20 which is located below the transverse axis 16. Because the ring or rim 20 is placed below the transverse axis 16, or the center of the spherical shaped body 12, it creates an air foil which causes lift and a gliding effect when the toy 10 is spinning and passing through the air. The configuration of the body 12 and the softness or resiliency of the material makes the
20 toy easy and safe to catch.

The annular ring or rim 20 includes a pair of surfaces including a first surface 22 which is closest to the transverse axis 16 and a second surface 24 which lies in a plane parallel to the plane containing the axis 16. The first surface 22 is curved away from the body 12 and towards the second surface 24 where it intersects same
25 at the outer edge of the ring or rim 20. The ring 20 is provided with an annular open groove 26 in the bottom surface 24. The annular open groove 26 has a flat annular surface 27 and a pair of side surfaces 28 and 29. The groove 26 is spaced inwardly from the edge of the ring where the first and second surfaces 22 and 24 intersect.

It should be noted that the upper portion of the spherical shaped body 12 is
30 larger than the lower portion as viewed in Figure 2. The toy 10 has an outside rim diameter at the edge of the rim of approximately 8 1/8 inches. The height of the toy 10 measured along the center axis 14 is approximately 3 1/2 inches. It will be appreciated that the bolt or toy 10 will be made in various sizes using generally the same shape and configuration.

In use, a person standing and throwing this object initially grips the rim 20 and spins the object, either overhand or underhand, backhand or forehand on a horizontal axis which will allow gyroscopic and aerodynamic principles to take effect, thus creating a gliding flight for the ball 10. The ball 10 can also be thrown
5 underhand or overhand on a vertical axis and bounced or rolled across the ground.

When the object or ball 10 is held by the rim and thrown in much the same manner as a person would a Frisbee disk, the air, as shown in Figure 4, travels a greater distance over the top of the ball 10 then below the ball 10. The air moving over the ball 10 creates a vacuum where the ball meets the lip or rim 20, thereby
10 aiding in achieving flight. The centrifugal force illustrated in Figure 3 by the series of arrows creates a gyroscopic stabilization which enables the ball 10 to remain stable in flight when thrown with the spin thereby allowing the aerodynamic principles to take effect.

The other embodiment is illustrated in Figures 5 and 6 and it discloses an
15 inflatable ball or toy 30 having the same overall appearance as the foam ball illustrated in Figures 1 and 2. The spherically shaped ball 30 is made in a rotational molding process utilizing vinyl plastic material which forms the spherically shaped body 32. The interior of the body 32 is hollow and a valve 36 is provided in the lower portion of the body 32 to permit air to be directed into the interior of 34 much like an
20 inflatable football or basketball. The body 32 has a center axis 38 and a transverse axis 40. The body 32 has an upper portion 31 and a lower portion 33 and further includes a radially outwardly extending annular rim or ring 42 which is located below the transverse center axis 40 as illustrated in Figure 6. The rim or ring 42 has a pair of first and second surfaces 44 and 46. The first surface 44 is curved away from the
25 body 32 and towards the second surface 46 where it intersects surface 46 at the outer edge of the rim 42. The second surface 46 is provided with an annular open groove 48 which has a flat annular surface 50 and a pair of side surfaces 52 and 54. The upper portion of the body 32 above the ring or rim 42 is larger in area than the lower portion of the body 32 located below the ring or rim 42. The ring 42 forms an
30 air foil which causes lift and a gliding effect when the ball is spun and is in flight. As with the first embodiment, the configuration of the ball and the softness makes it easy to catch. A person standing and throwing the ball 30 with a spin, either overhand or underhand, backhand or forehand on a horizontal axis allows well known gyroscopic and aerodynamic principles to come into play thus creating a
35 gliding flight for the ball 30. Because the air travels a greater distance across the top

of the ball, an aerodynamic lift is created. Air moving under the ball creates a vacuum where the ball meets the grooved rim 42. This also aids in achieving flight.